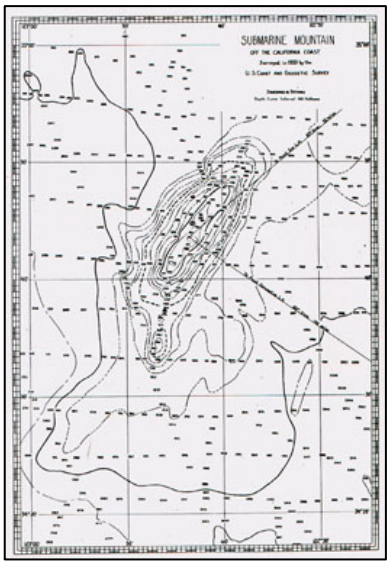
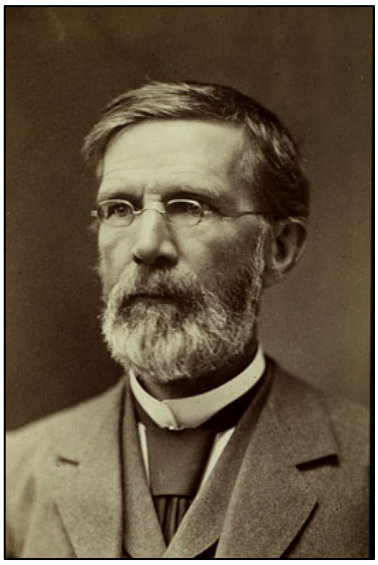
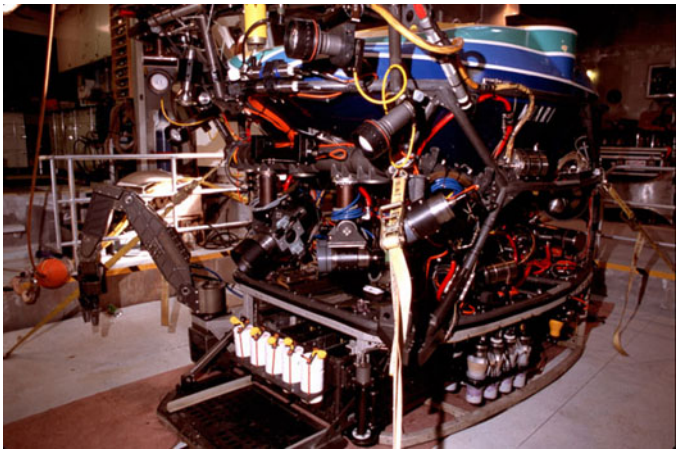
Cultural History of Davidson Seamount:
A Characterization of Mapping, Research, and Fishing







Erica J. Burton
Monterey Bay National Marine Sanctuary
Technical Report

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COVER IMAGES

Top left:
Davidson Seamount, the first undersea feature to be officially termed a seamount by the U.S. Board on Geographic Names. This feature was surveyed by the C&GS in 1933 and named in honor of the great Coast Survey West Coast pioneer George Davidson, 1825-1911. Latitude should range from 35 to 36 degrees. Image Credit: NOAA Central Library Historical Collection (NOAA Photo Library) and original chart credit: Association of Commissioned Officers (1933).

Top right:
George Davidson (circa 1883). Credit: NOAA, B.A. Colonna Album (NOAA Photo Library)

Bottom:
Monterey Bay Aquarium Research Institute's ROV *Tiburon*. Credit: T. Trejo for NOAA.

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INTRODUCTION

Davidson Seamount is an inactive volcanic undersea mountain habitat off the coast of central California, 129 kilometers to the southwest of Monterey and 121 kilometers west of San Simeon (Fig. 1). It is one of the largest known seamounts in U.S. waters (42 kilometers long and 13 kilometers wide). From base to crest, the seamount is 2,280 meters tall, yet its summit is still 1,250 meters below the sea surface. The seamount has been called "An Oasis in the Deep" in an otherwise flat seafloor, hosting large coral forests, vast sponge fields, crabs, deep-sea fishes, shrimp, basket stars, and high numbers of rare and unidentified benthic species.

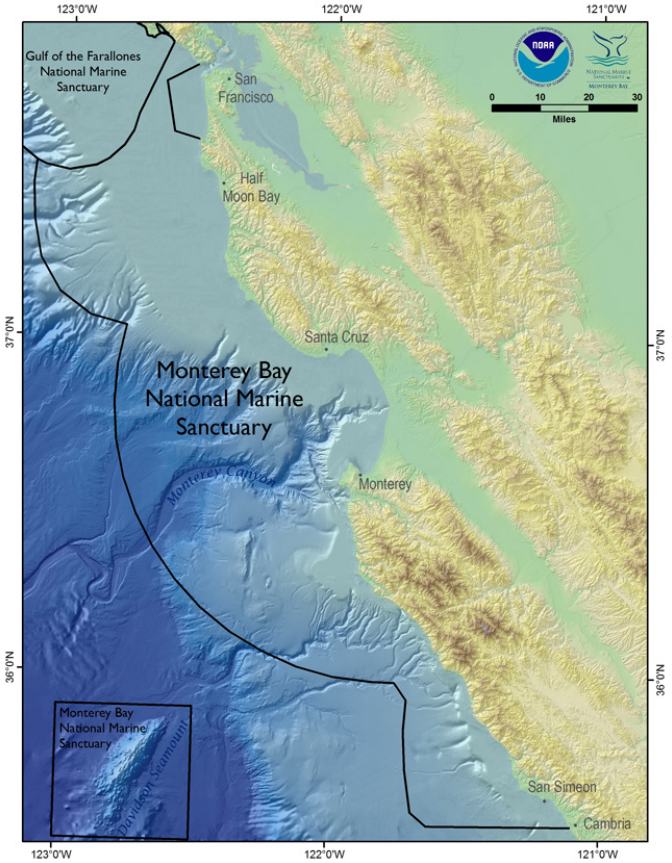

Figure 1. Monterey Bay National Marine Sanctuary, including Davidson Seamount Management Zone.

The Office of National Marine Sanctuaries determined that the Davidson Seamount required protection from the take of, or other injury to, benthic organisms or those organisms living near the seafloor because of the seamount's special ecological and fragile qualities, and potential future threats that could adversely affect these qualities. In 2009, the Monterey Bay National Marine Sanctuary (MBNMS) expanded to include the Davidson Seamount Management Zone (2,007 square kilometers; Fig. 1).

The seamount has special national significance relative to ocean conservation, ecological, scientific, educational, aesthetic, and historical qualities. Throughout history Davidson Seamount has played a role in mapping, research, and fishing. The role of the seamount in the region's rich maritime past is characterized here.

MAPPING

The history of mapping and research at the Davidson Seamount is relatively simple (Table 1); however, the collective activities have produced dramatic results. Two significant technologies made possible the discovery and mapping of the Davidson Seamount: echo sounding and radio-acoustic ranging (Captain A.E. Theberge, Jr., NOAA Corps, retired, pers. comm.). Echo sounding technology uses sound pulses to determine water depth. The interval between sound emission and return, and the known speed of sound propagation through water, determines depth (for more information see, http://www.photolib.noaa.gov/cgs/sound.html). In late 1923, the U.S. Coast and Geodetic Survey (USC&GS) acquired its first acoustic sounding system (Theberge 1989, Theberge 2010). The USC&GS Ship *Guide* (Fig. 2) was outfitted with a Hayes sonic depth-finding unit, and was used to take deep-water soundings during a voyage from Norfolk, Virginia to San Diego, California. This was the beginning of an extensive USC&GS program of continental margin surveys.

Table 1. Chronology of notable mapping, research, and monitoring activities at Davidson Seamount. Abbreviations listed at end of table.

Date	Activity
1933	**Mapping** U.S. Coast and Geodetic Survey conducts first mapping survey of Davidson Seamount aboard the Ship *Guide* (see Figs. 2 and 3) http://www.photolib.noaa.gov/htmls/map00136.htm
1958 (Mar)	**Oceanography** SIO studies flow patterns over Davidson Seamount (Jennings and Schwartzlose 1960)
1979	**Geology** USGS dredges rock samples (Davis et al. 2002, 2007)
1998	**Mapping** MBARI collects multibeam bathymetry data (30 meter resolution) using Simrad EM300 aboard M/V *Ocean Alert* (Davis et al. 2002)
1998 (Jul) - 1999 (Jan)	**Oceanography** NPS and partners study ocean circulation and sound; place autonomous sound source on Davidson Seamount and continuously monitor with receiver on Sur Ridge (Onofre 1999)
2000 (May)	**Geology** MBARI collects rock samples and imagery using ROV *Tiburon* aboard R/V *Western Flyer* (D.A. Clague, MBARI, pers. comm; Davis et al. 2007)
2000 (Jul)	**Biology** NMFS conducts aerial survey for marine mammals aboard NOAA Shrike Aero Commander (Forney 2002)
2002 (May)	**Biology and Geology** MBNMS, MBARI, MLML, MBA explore seamount and collect biological specimens, rocks, and imagery using ROV *Tiburon* aboard R/V *Western Flyer*; includes opportunistic survey of marine mammals and seabirds (DeVogelaere et al. 2005, Davis et al. 2007) http://www.sanctuarysimon.org/projects/project_info.php?projectID=100114&site=true

Date	Activity
2006 (Jan-Feb)	**Biology and Geology** MBNMS, MBARI, MLML, BBC study coral distribution, collect biological specimens, rocks, and high-definition imagery using ROV *Tiburon* aboard R/V *Western Flyer* http://www.sanctuarysimon.org/projects/project_info.php?projectID=100307&site=true
2006	**Mapping** MBARI collects multibeam bathymetry data (3 meter resolution) using mapping AUV *D. Allan B* (D.A. Clague, MBARI, pers. comm.)
2009 (Apr)	**Biology** MBARI and MBNMS collaborate on long-term monitoring, modeling of deep-sea coral distribution, and predictions of change to the deep-sea due to ocean acidification; includes coral observations, video transects, coral transplants, and animal collections for shipboard studies using ROV *Doc Ricketts* aboard R/V *Western Flyer* (A.P. DeVogelaere, MBNMS, pers. comm.)
2009 (Apr)	**Biology** CINMS conducts aerial survey for marine mammals using NOAA Twin Otter (N.A. Senyk, CINMS, pers. comm.)
2010	**Mapping** MBARI collects multibeam bathymetry data (3 meter resolution) using mapping AUV *D. Allan B* (D.A. Clague, MBARI, pers. comm.)
2010 (Jan)	**Biology** MBNMS, MLML, UCSC conduct aerial survey for marine mammals using NOAA Twin Otter (King 2010) http://www.sanctuarysimon.org/projects/project_info.php?projectID=100381&site=true
2010 (Apr)	**Biology** MBNMS, MLML conduct aerial survey for marine mammals using NOAA Twin Otter (King 2010) http://www.sanctuarysimon.org/projects/project_info.php?projectID=100381&site=true
2010 (Jul)	**Biology** MBNMS, UCSC, and MLML conduct first dedicated at-sea survey of the Seamount to record marine mammal and seabird observations, aboard NOAA SHIP *McArthur II* (King 2010; Newton and DeVogelaere 2013)
2011 (Jul)	**Biology** MBNMS, NMFS, CDFW, UCSC, MLML, CSUMB conduct aerial survey for marine mammals using NOAA Twin Otter (A.P. DeVogelaere, MBNMS, pers. comm.)

Abbreviations

AUV: autonomous underwater vehicle
BBC: British Broadcasting Corporation
CDFW: California Department of Fish and Wildlife
CINMS: Channel Islands National Marine Sanctuary
CSUMB: California State University Monterey Bay
MBA: Monterey Bay Aquarium
MBARI: Monterey Bay Aquarium Research Institute
MBNMS: Monterey Bay National Marine Sanctuary
MLML: Moss Landing Marine Laboratories
NMFS: National Marine Fisheries Service
NPS: Navy Postgraduate School
ROV: remotely operated vehicle
SIO: Scripps Institution of Oceanography
UCSC: University of California at Santa Cruz

Figure 2. U.S. Coast and Geodetic Survey Ship *Guide*, in service 1923-1941. Image credit: NOAA Office of NOAA Corps Operations (NOAA Photo Library).

Concurrent with the development of echo sounding, the USC&GS developed the radio-acoustic ranging (RAR) method of navigation; the first survey-quality navigation system that did not need to see fixed, known objects on land for inshore piloting navigation or astronomical bodies for celestial navigation. RAR navigation involved determining an accurate velocity of sound in sea water in the local working area, detonating a TNT bomb off the stern of a surveying vessel, recording the time of explosion at the ship using a chronograph and receiving the sound signal at two or more hydrophones at known locations (for more information see Theberge 2009).

Upon arrival at San Diego, the Ship *Guide* continued testing this new RAR system of survey navigation (Theberge 2010). RAR was first used operationally by the Ship *Guide* off the coast of Oregon in 1924. Within a few years, most major USC&GS ships were using RAR for continental shelf and slope surveys.

In 1933, the USC&GS conducted the first mapping survey of Davidson Seamount using echo sounding aboard the Ship *Guide* (Captain F.L. Peacock commanding; Figs. 2, 3). Davidson Seamount was the first geographic feature to be characterized by the term "seamount" in 1938 by the United States Board on Geographic Names, and was named in honor of the late USC&GS scientist George Davidson, a leader in charting the waters of the west coast (Davidson Seamount 1990).

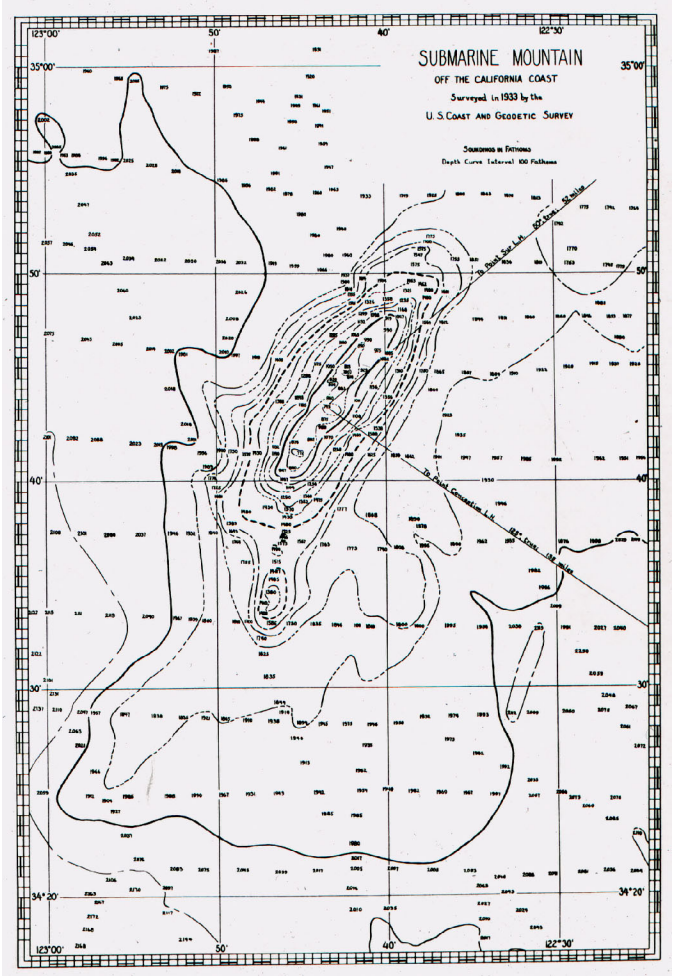

Figure 3. Davidson Seamount, the first undersea feature to be officially termed a seamount by the U.S. Board on Geographic Names. This feature was surveyed by the C&GS in 1933 and named in honor of the great Coast Survey West Coast pioneer George Davidson, 1825-1911. Latitude should range from 35 to 36 degrees. Image Credit: NOAA Central Library Historical Collection (NOAA Photo Library) and original chart credit: Association of Commissioned Officers (1933).

George Davidson (1825-1911) was a pioneer scientist and surveyor, who spent nearly six decades working for the USC&GS (forerunner of today's National Ocean Service of the National Oceanic and Atmospheric Administration; Fig. 4). Davidson demonstrated skills of hydrographer, geodesist, geographer, astronomer, seismologist, civil engineer, historian, and teacher for the scientific and engineering community, the citizens of the United States, and the development of the west coast (NOAA 2006). For example, along the U.S. Pacific Coast he made the most accurate measurements of the latitudes and longitudes of vital landmarks along the coast using simple geometric hand tools. In the 1850s, he chose the sites for many of today's lighthouses, and created an extensive catalogue of stars for use in celestial navigation. His many contributions to maritime history and his personality as a maritime figure are important and have heritage value (for more information see http://montereybay.noaa.gov/sitechar/george.html).

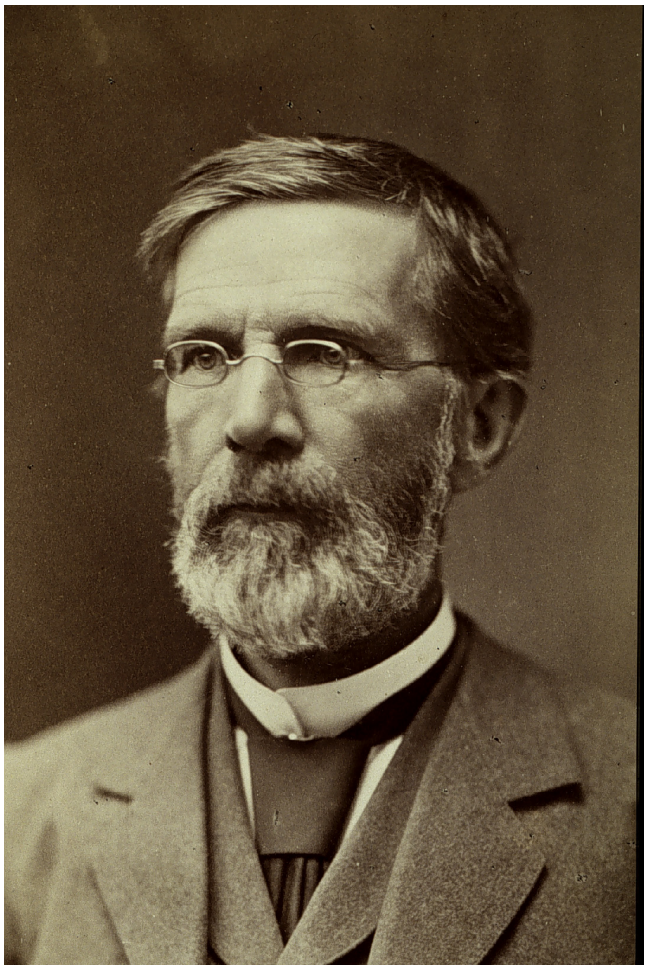

Figure 4. George Davidson (circa 1883). Credit: NOAA, B.A. Colonna Album (NOAA Photo Library).

Since first mapped in 1933, there have been ongoing charting efforts. Notable efforts include high-resolution mapping by Monterey Bay Aquarium Research Institute (MBARI). In 1998, MBARI completed detailed sidescan and multibeam surveys to precisely map the shape and structure of the seamount (30-meter resolution; http://www.mbari.org/data/mapping/monterey/). In 2006 and 2010, MBARI collected multibeam bathymetry data at 3-meter resolution using the autonomous underwater vehicle (AUV) *D. Allan B*. With the most recent survey technology, geologic features such as lava pools, and inflated and collapsed lava flows can be remotely sensed (D.A. Clague, MBARI, pers.comm.).

RESEARCH AND MONITORING

Oceanography

In March 1958, drogue drifters were deployed thirty to seventy miles offshore of central California to study flow patterns of the California Current (Jennings and Schwartzlose 1960). The parting of two drifters in the vicinity of Davidson Seamount raised questions on the relationship between the dynamic topography and direct current measurements. Rizk and Ryan (2006) suggested the parting of drifters over the seamount would be expected from a Taylor

column; a flow feature created when water flows over a sphere or bump at the base of the water column.

Rizk and Ryan (2006) analyzed CalCOFi data, SeaWiFS, frontal probabilities and wind and current data from National Data Buoy Center and MBARI which indicated that Davidson and San Juan seamounts may affect circulation patterns of the California Current (CC) and California Undercurrent (CUC). Data analysis suggested that a strong current is associated with the retention of a meander over Davidson or San Juan. An abyssal eddy could possibly hold the meander, although no deep measurements were collected during this study. The authors further suggest there is little definitive evidence of meanders forming over the seamounts more often than elsewhere, although low frontal probabilities are seen directly offshore the seamounts, perhaps indicating that meanders stay stationary offshore of the seamounts more often than elsewhere along the coast. Additionally, low frontal probabilities are seen upstream of Davidson perhaps indicating a Taylor column or some similar feature.

In the late 1990s, the Naval Postgraduate School placed an autonomous sound source on the seamount to study and model the acoustic tomography signal transmission between this offshore location and a bottom-lying, cabled-to-shore receiver on Sur Ridge (Onofre 1999). This study was part of a larger multi-partner project (Innovative Coastal-Ocean Observing Network, ICON; http://www.nps.edu/Academics/GSEAS/ptsur/ICON.html) to study oceanography in central California waters, and to ultimately model and forecast coastal ocean conditions.

Geology

The first documented rock samples were dredged from the Davidson Seamount by the U.S. Geological Survey in 1979. These samples, along with subsequent rock collections by MBARI in 2000, 2002, and 2006, have been used to determine seamount age, composition, and a previously unrecognized type of volcanism (Davis et al. 2002, Davis et al. 2007). Davidson Seamount has complex morphology; trending northeast-southwest, it is composed of about 6 linear ridges, with a large cone structure at the southwest end. It last erupted about 9.8 million years ago.

In May 2000, MBARI conducted a geologic survey at Davidson Seamount using a remotely operated vehicle (ROV). In-situ imagery of large, colorful, and diverse corals and sponges on the seamount captured the attention of geologists and biologists, alike (Fig. 5).

Call For Exploration

On June 12, 2000, U.S. President William Jefferson Clinton (1993-2001) announced the commencement of a new era of ocean exploration (NOAA 2000). He directed the Department of Commerce (DOC) to lead three new expeditions, including one to Davidson Seamount, in collaboration with private partners, employing the latest submersible technologies and sharing the discoveries with schoolchildren and the public via the Internet and satellite communications. Clinton also directed the DOC to convene a panel of leading ocean explorers, educators, and scientists to develop a national oceans exploration strategy. The Panel recommended the formation of the U.S. Ocean Exploration Program (NOAA 2000).

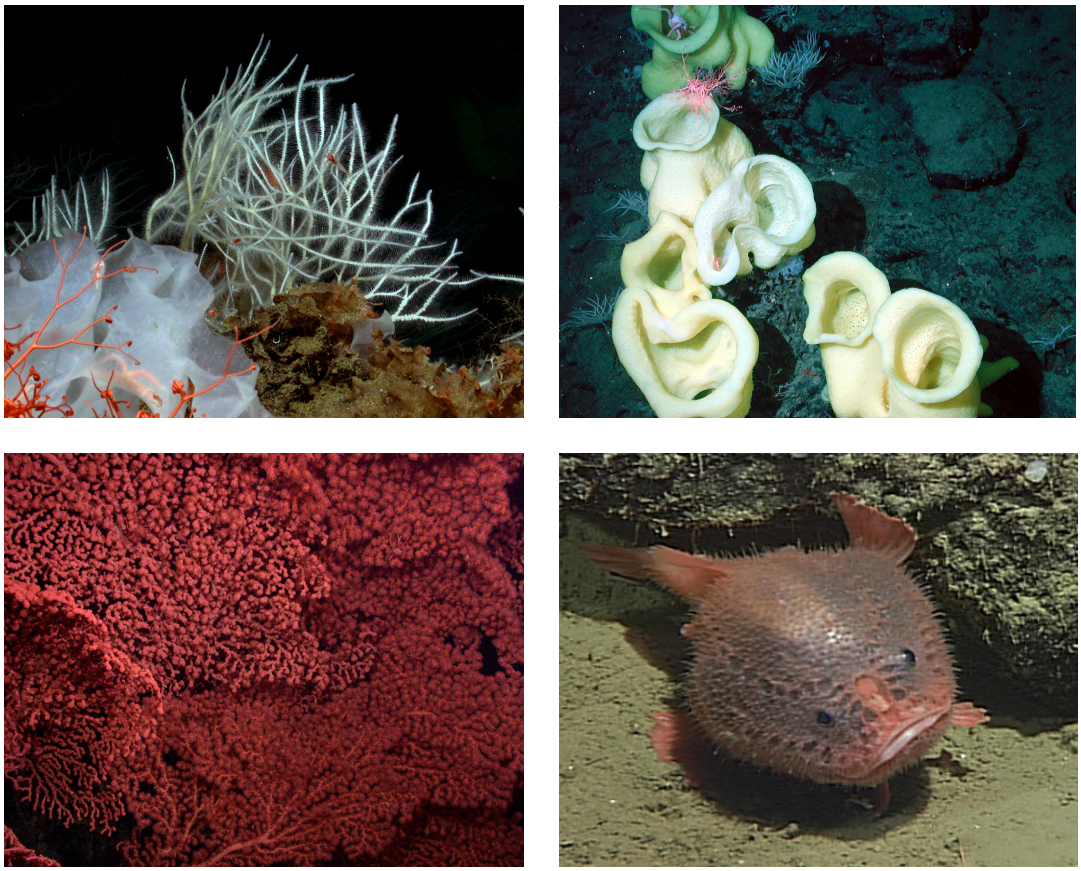

Figure 5. Davidson Seamount organisms. Clockwise from top left: Carnivorous sponge (*Asbestopluma* sp. nov.); Picasso sponge (*Staurocalyptus* sp. nov.); Deep-sea angler fish (*Chaunacops coloratus*); Bubble gum coral (*Paragorgia arborea*). Credit: NOAA/MBARI.

Seamount Biology

Shortly after the formation of NOAA's Office of Ocean Exploration (OE), the MBNMS led an ROV expedition during May 2002 in collaboration with Monterey Bay Aquarium Research Institute (MBARI), Monterey Bay Aquarium (MBA), and Moss Landing Marine Laboratories (MLML) aboard MBARI's R/V *Western Flyer*. The investigators set out to explore the seamount at all depths with the primary purpose of characterizing species patterns of distribution and abundance; including biological observations at the sea surface, in the mid-water, and on the seamount itself. Deep-sea corals were collected for age determination studies, including bamboo coral (*Keratoisis* sp.; Fig. 6) and precious coral (*Corallium* sp.; Fig. 6). Results indicated coral colonies were long-lived (greater than 200 years for bamboo coral) and slow growing (linear growth rate of 0.25 cm/year for precious coral; Andrews et al. 2005).

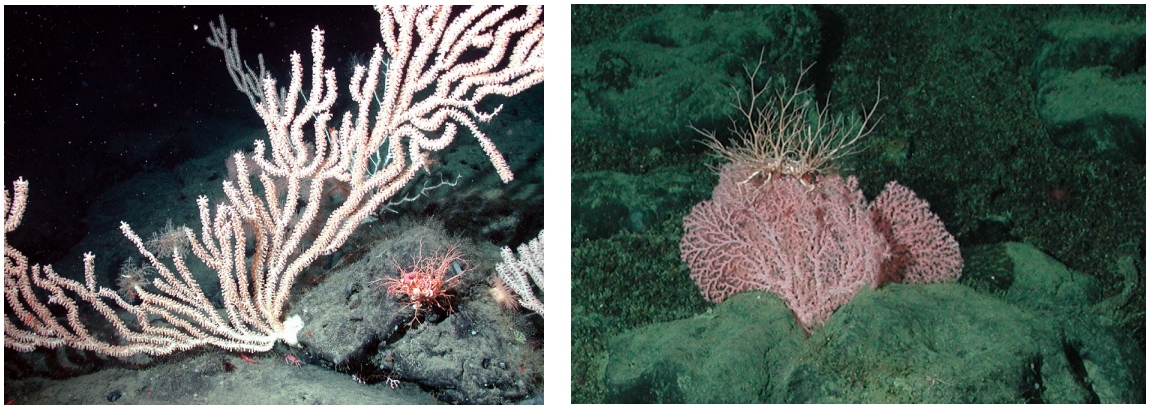

Figure 6. Deep-sea corals at Davidson Seamount. Left: Bamboo coral (*Keratoisis* sp.). Right: Precious coral (*Corallium* sp.). Credit: NOAA/MBARI.

The 2002 expedition was selected as one of OE's Signature Missions, which included a dedicated web site of daily logs, mission plan, topical essays, explorer biographies, and interactive "Ask an Explorer" question and answer session held during the expedition (http://oceanexplorer.noaa.gov/explorations/02davidson/davidson.html). This cruise received perhaps unparalleled, national media attention for central California marine science.

In 2006, MBNMS, MBARI, and MLML scientists returned to Davidson Seamount, to study coral distribution and to test a model that predicts where corals are expected to occur. The British Broadcasting Corporation (BBC) joined the expedition to collect high-definition video imagery to feature Davidson Seamount's spectacular benthic organisms in their "Planet Earth" television series. The expedition was again shared on OE's web site (http://oceanexplorer.noaa.gov/explorations/06davidson/welcome.html). Additional bamboo coral colonies (*Keratoisis* sp.) were collected to corroborate previous age and growth estimates. One large colony had an upper age estimate of 450 years (Andrews et al. 2007).

In 2009, MBARI and MBNMS scientists initiated long-term monitoring and modeling of deep-sea coral distribution, and predictions of change to the deep-sea due to ocean acidification. Experiments included transplanting corals (*Corallium* sp., *Keratoisis* sp., and *Paragorgia* sp.), to deeper depths of the seamount, and collecting clams (*Acesta mori*) for shipboard studies of metabolic rate changes in response to elevated CO_2 levels.

Since 2002, at least 237 taxa have been documented at Davidson Seamount (Burton and Lundsten 2008), including 18 species new to science (8 sponges, 1 hydroid, 4 corals, 1 ctenophore, 1 nudibranch, 1 polychaete, 1 seastar, and 1 tunicate). In addition, a rare deep-sea anglerfish (*Chaunacops coloratus*) specimen observed and collected at Davidson Seamount contributed to new behavioral, morphological, and molecular data to an under-sampled group of deep-sea fishes (Lundsten et al. 2012).

Seamount environments may represent optimal habitats for particular faunal groups resulting in thriving and dense populations encountered only rarely in other habitats. Based on research at Davidson Seamount and nearby Monterey Canyon, preliminary evidence suggests seamount communities may serve as a source of larvae for non-seamount habitats (McClain et al. 2009).

New technologies have only recently allowed scientists to bring back dramatic high-resolution images from the deep sea, offering researchers and the public an opportunity to witness the never before seen glimpses of rare marine species living in this largely cold, dark, and mysterious habitat. The proximity of education and research institutions in the Monterey Bay region facilitate interdisciplinary collaborations that enhance research and education about this spectacular area.

Sea-Surface Biology

The Davidson Seamount has been regarded as having a greater abundance and diversity of marine mammals and seabirds than the surrounding area (King 2010; Don Roberson, independent bird naturalist, pers. comm.). Naturalists have visited the seamount at least 10 times to observe a diverse group of seabirds that are not regularly seen in the Monterey Bay area (MacKnight et al. 2011). In an effort to characterize marine mammal abundance above, and moderate distances away from, the seamount, several surveys have been conducted using planes and research vessels.

In partnership with NOAA Fisheries, an aerial survey above Davidson Seamount was incorporated into a larger survey of the MBNMS in July 2000 to provide information about species occurrence of marine mammals, seabirds, turtles, sharks, and ocean sunfish in this region (Forney 2002, MacKnight et al. 2011). Since then, several smaller aerial surveys have been conducted using planes of opportunity (April 2009, January 2010, April 2010, July 2011; http://sanctuarysimon.org/projects/project_info.php?projectID=100381&site=true). Various transect methods were tested to develop long-term monitoring plans.

During the 2002 ROV expedition aboard R/V *Western Flyer*, a NOAA Fisheries scientist led a sea-surface survey from the deck of the same vessel (Benson 2002). Marine mammals, seabirds, and surface-active fishes were observed using large "bigeye" binoculars. Twenty-two marine mammal sightings were recorded; eight species were observed. The most commonly sighted species was Dall's porpoise (*Phocoenoides dalli*). One hundred seventy-three sightings of seabirds were recorded, where Black-footed Albatross (*Phoebastria nigripes*) was the most common species. As part of the ongoing scientific efforts to monitor the status and recovery of sperm whales in the Eastern North Pacific, scientists attempted to obtain skin samples from a small pod of sperm whales.

In addition, the first dedicated ship-based survey to record marine mammal and seabird observations above and surrounding the Davidson Seamount was conducted during July 2010 (Newton and DeVogelaere 2013; Fig. 7). Zooplankton and CTD (conductivity, temperature, depth) data were also collected above the seamount. During the 2010 survey there were 200 marine mammal sightings, where fin whales (*Balaenoptera physalus*) were the most commonly encountered marine mammal (51% of sightings), comprising 94% of whales sighted. The majority of fin whale sightings were above and to the west of the seamount where, based upon zooplankton net tows, krill abundance was greatest; and foraging behavior was noted by observers.

Figure 7. Marine Mammals and Seabirds at Davidson Seamount. Clockwise from top left: fin whale (*Balaenoptera physalus*); Northern right whale dolphin (*Lissodelphis borealis*): Cook's Petrel (*Pterodroma cookii*); Arctic Tern (*Sterna paradisaea*) on drift kelp. Credit: Abe Borker for NOAA.

Davidson Seamount is regionally important for science, to study how the seamount is ecologically linked with the coastal waters, nearshore canyons, and species currently protected in the MBNMS. A recent assessment of natural resources in offshore habitats of MBNMS describes the current scientific knowledge of the physical and biological resources, and processes, including Davidson Seamount (Brown et al. 2013). Efforts are underway to understand how the Monterey Bay and Big Sur Canyon complexes have an effect on Davidson Seamount and what the movement pattern of species is between the seamount and nearshore.

FISHERIES

Whaling

Monterey, California was the site of the first commercial shore-whaling operation on the west coast of North America (Reeves and Smith 2010). Literature indicates the operation was initiated and station built about 1854 (Scammon 1874; Starks 1923; Reeves and Smith 2010; Allen et al. 2011).

Other shore-whaling stations, further south and closer to Davidson Seamount, included San Simeon Cove (1865-1892; Fig. 8), and San Luis Obispo (Port Harford, 1868-1887). These stations primarily captured humpback and gray whales.

Shore whaling involved deploying open boats from land to pursue, capture, and tow whales to the beach for processing (Scammon 1874; Reeves and Smith 2010). Whaling during operation of these sites tended to stay within 10 nautical miles of shore (Scammon 1874, Collins 1892). Davidson Seamount however, is 65 nautical miles west of San Simeon; so shore-whaling operations reaching the seamount are highly unlikely.

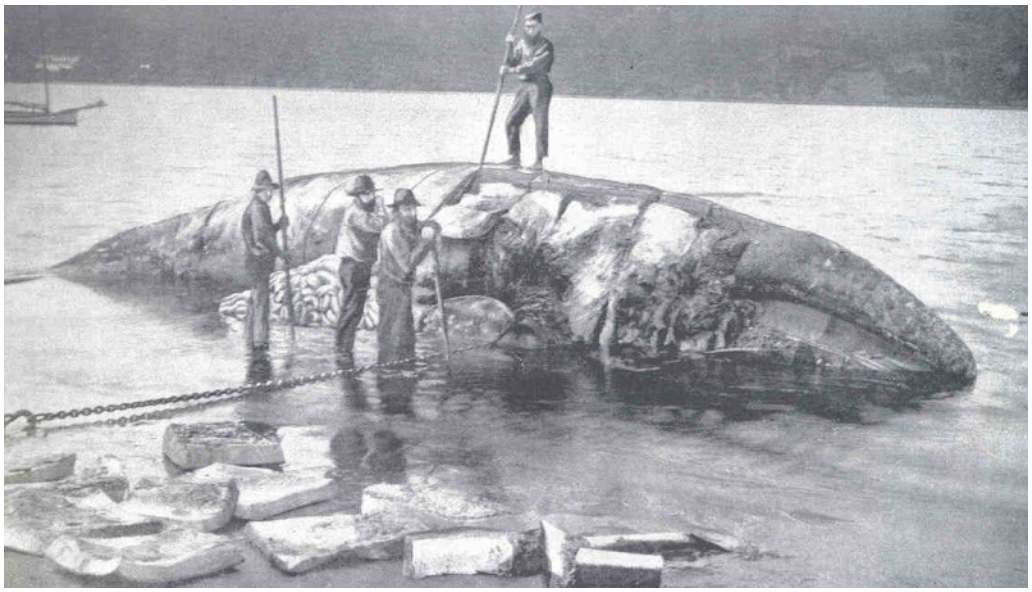

Figure 8. Flensing a whale at San Simeon Bay, California. Credit: from Collins 1892.

On the California coast, conventional ship whaling was carried on at the same time as shore whaling, but the ships whaled mostly off coast in passing to or from more productive Arctic whaling ground (Starks 1923). They primarily confined their operations to right and sperm whales.

By 1905, steam-powered ships and harpoon cannons made possible the exploitation of whales that were farther offshore (Allen et al. 2011). In addition, spotter planes and radio communication were used to locate whales more efficiently.

Modern industrial whaling in the greater North Pacific Ocean began in the late 1940s (Springer et al. 2003). Whales captured during this time included abundant fin whale (*Balenoptera physalus*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*). Whaling boats may have targeted the Davidson Seamount area, however catch records specific to Davidson Seamount were not located.

Uncontrolled commercial whaling led the U.S. to enact into law the Marine Mammal Protection Act (MMPA) in 1972 and the Endangered Species Act in 1973 (Allen et al. 2011). The MMPA provided broad protections for marine mammals, prohibiting take in U.S. waters. By the mid-

1970s, all great whale stocks in the North Pacific Ocean were severely diminished (Springer et al. 2003). Today, several great whales observed at Davidson Seamount remain endangered including fin whale (*Balenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and sperm whale (*Physeter macrocephalus*); www.sanctuarysimon.org/monterey/sections/specialSpecies/. In June 1994, eastern North Pacific stock of gray whale was removed from the endangered species list.

Finfish

The seamount was likely too remote for historical finfish fisheries to operate. In recent years however, two commercial finfish fisheries have operated in the top 150 feet (46 meters) of water above Davidson Seamount targeting highly migratory pelagic species: drift gillnetting for swordfish and sharks, and trolling for albacore tuna (NOAA 2008, MBNMS 2012; Fig. 9). Swordfish and pelagic sharks are primarily caught with drift gillnets. Albacore Tuna are caught both commercially and recreationally by trolling lures or live bait. For the last 35 years, a Morro Bay albacore fisherman has visited the seamount 4-5 times per year for overnight sport fishing trips (MacKnight et al. 2011). Fishermen have reported that the seamount may enhance albacore fishing in some years (NOAA 2004, MBNMS 2012). The seamount itself is too deep for current fish trawling technology, where fish density is very low, and the species seen to date are not commercially desirable (G.M. Cailliet, MLML, pers. comm.).

In 2006, NOAA Fisheries designated Davidson Seamount as an Essential Fish Habitat (EFH) Conservation Area and prohibited all fishing below 3000 feet (the same area proposed to be included in the MBNMS as Davidson Seamount Management Zone; 71 FR 27408, 11 May 2006). EFH Conservation Areas are designated to minimize to the extent practicable adverse effects to EFH caused by fishing (16 U.S.C. 1853 section 303(a)(7)).

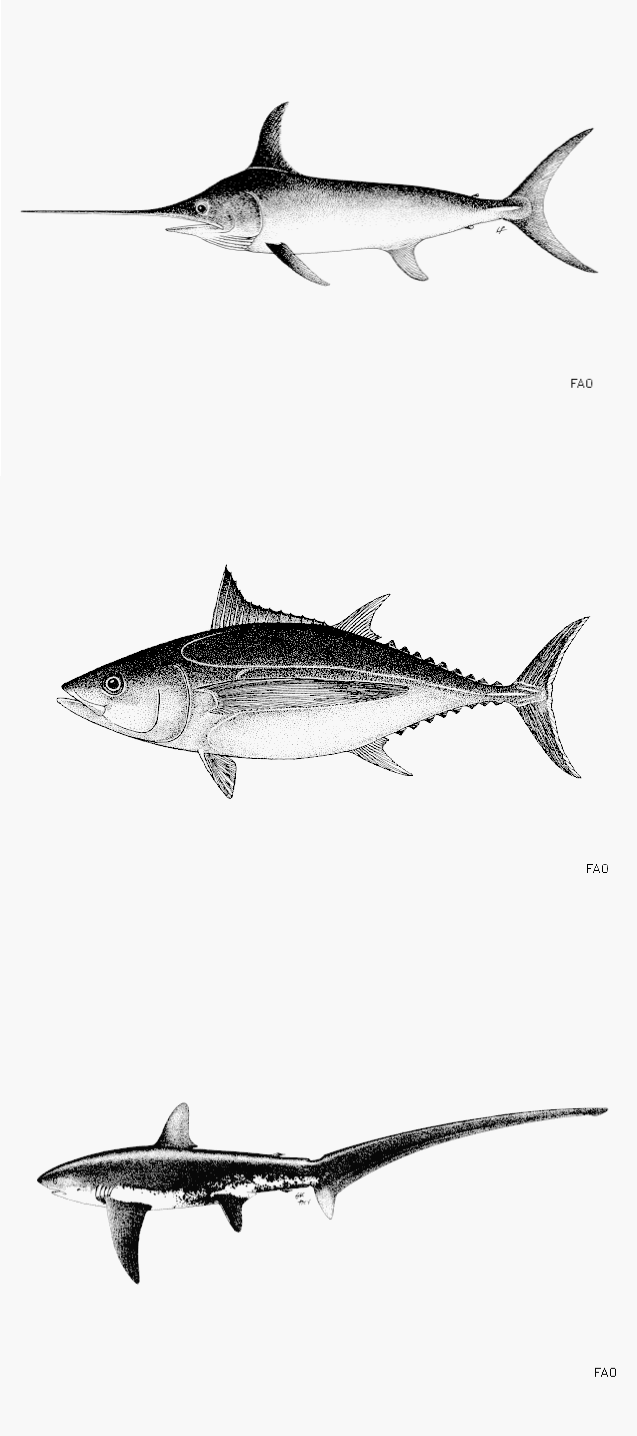

Figure 9. Fishes targeted at Davidson Seamount. Top to bottom: Swordfish (*Xiphias gladius*); Albacore (*Thunnus alalunga*), and Common Thresher Shark (*Alopias vulpinus*). Credit: FAO.

CONCLUSION

Davidson Seamount has played a role in the cultural history of the region including mapping, scientific exploration, research and monitoring, and fishing activities. Recent research has produced dramatic results, and Davidson Seamount is now one of the better-explored seamounts in the world (Clague et al. 2010).

As part of its' ecosystem based management approach, MBNMS is currently working with many partners to establish Sanctuary Ecologically Significant Areas (SESAs). These special areas encompass remarkable, representative and/or sensitive marine habitats, communities and ecological processes. SESAs will be focal areas for facilitating research to better understand natural and human-caused variation. As part of this effort, Davidson Seamount was identified as a SESA by the MBNMS. Work will continue to describe the Davidson Seamount, and compare findings to other seamounts nationally and worldwide.

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